

Tobii Eye Tracking: Research with Vision

Cognitive Psychology

Developmental Psychology

Experimental Psychology

Human Computer Interaction

Media Psychology & Industrial Design

Neuropsychology

Mental Health Disorders

Ophthalmology

Eye tracking for excellence.

Eye tracking provides unique insights into visual perception and human behavior. Tobii hardware and software have quickly become the leading state of the art system, providing unsurpassed testing efficiency and tracking quality.

The Tobii Eye Trackers offer a unique platform and opportunity to work with Tobii Studio™ – the most comprehensive gaze analysis and visualization software on the market. Become part of the large community of researchers already using Tobii products and share your experiences and findings with other researchers through Tobii's online forum. Rely on easy set-up, professional support and training services, and focus on what is most important to you: your research.

Fully automatic eye tracking

- Ease of operation makes it possible to set up and execute tests without eye tracking experience.
- Automatic and robust eye tracking significantly saves time when conducting studies.
- Quick and long lasting calibration makes each test easy to set up and run.

Completely unobtrusive

- Great tolerance of head movements removes all need for chin-rests and other restraints.
- Truly remote eye tracking integrated into normal computer screens with built-in user camera.
- Completely natural environment for subjects minimizes experimental effects.
- Long studies can be performed without fatigue for the subject or reduced quality of data.

State-of-the-science tracking quality

- High tracking accuracy and excellent head-movement compensation provides reliable data with high confidence.
- Automatic optimization of bright and dark pupil tracking, regardless subject's

eye color or ethnicity, and high tolerance to glasses and contact lenses guarantees performance.

- Advanced drift compensation guarantees high tolerance to varying light conditions.

Flexible analysis tools

- Flexible stimuli generation, including slideshows, moving stimuli, external video capture, scene camera, web pages and more.
- Various data export and filtering options enable data abstraction and filtering without removing flexibility or access to raw data (Matlab/SPSS compatible).
- Powerful visualization and statistics tools allow for high-level qualitative and quantitative analysis.
- Built-in integration to other software packages (such as E-Prime) provides additional stimulus generation and analysis capabilities.

Dedicated infant features

- Customized calibration routines for babies and other subjects with limited attention.
- Large tolerance to head motion enables eye tracking of subjects who cannot be still.
- Easy set up of bold, attention-grabbing stimuli containing video and audio.

Understand visual perception and human behavior.

Eye tracking is used to answer an endless array of research questions in fields such as cognitive psychology, developmental psychology, experimental psychology, neuropsychology & mental health disorders, ophthalmology, media psychology, and Human Computer Interaction.



Cognitive psychology

Cognitive scientists use Tobii Eye Trackers to answer fine-grained questions relating to the perception of visual stimuli. Eye-movement data are correlated to information processing and problem-solving capabilities, in evaluations of reading, Human Computer Interaction (HCI), and more.

- Study the interplay between visual perception and reading-and-tracking-task performance.
- Identify the cause of poor reading skills, i.e. relations between the control of eye movements and reading comprehension.
- Study the cognitive process of respondents selectively concentrating on one aspect of the environment while ignoring other matter and stimuli.
- Examine human factors in Human Machine Interaction (HMI) and Human Computer Interaction (HCI).

Eye-movement data help psycholinguists develop efficient learning programs for dyslexic children. Eye movements also

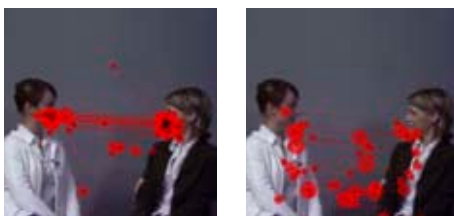
provide insight into the relationship between attention and performance in situations where strong skills or decision making abilities are critical, i.e. driving.

Developmental psychology

Developmental researchers use eye tracking to explain growth and transformation in cognitive, social and emotional abilities, spanning the period from infancy through young adulthood.

- Understand developmental progression in children's allocation of attention.
- Measure visual perception related to understanding and recall.
- Measure infants' ability to recognize motion signals when predicting reappearance of moving objects.
- Investigate relationships between control of eye movements and reading comprehension.

At the infant lab at Uppsala University eye tracking studies have identified differences in social interactions in normal children and children with autism.





Eye tracking experiments show differences in visual interest and scan paths of drivers and pedestrians.

Experimental psychology

Eye tracking is an established technique in laboratory experiments where human perception and performance are tested in attention, learning, and memory tasks:

- Scene-analysis and visual-perception experiments
- Reaction-time experiments using eye-movement responses
- Experiments on the relation of learning and performing by exploration
- Experiments on how visual information is perceived, stored and recalled in memory
- Face-to-face communication experiments

Through the inclusion of eye tracking in these experiments, researchers can:

- Get insight into how selections are made between task-relevant and not-relevant information.
- Determine if selections are made based on spatial representation or perceptual objects.
- Understand visual-attention mechanisms underlying lateral masking or crowding effects (Flanker test).
- Reveal social characteristics and cultural processes (organizational behavior and business communication).
- Create gaze contingent paradigms with area of interest hit-tests and allow dynamic user interaction.

Eye tracking experiments have found differences in visual-spatial working memory in healthy and damaged brains.



Media psychology & industrial design

In media research eye tracking provides access to visual attention, cognitive processes and behavior of receivers of mediated communication.

HCI & usability research

Eye tracking is a well established technique for conducting research that embraces cognitive, pedagogical and social aspects of Human Computer Interaction (HCI).

Media psychology & industrial design

- Measure true psychological impact of different media formats and messages.
- Understand human perception of print ads, TV commercials, shopping shelves, outdoor ads, web pages and direct mailings.
- Find out how visual elements get and keep the highest attention (or no attention).
- Determine the impact of placement and ability to cut through cluttered scenes.

In industrial design and industrial ergonomics, eye movements provide important data for improving aesthetics, usability, engineering, production and marketability of physical products.

- Optimize design of control panels, digital prototypes, physical products, packaging and labeling.

HCI and usability research

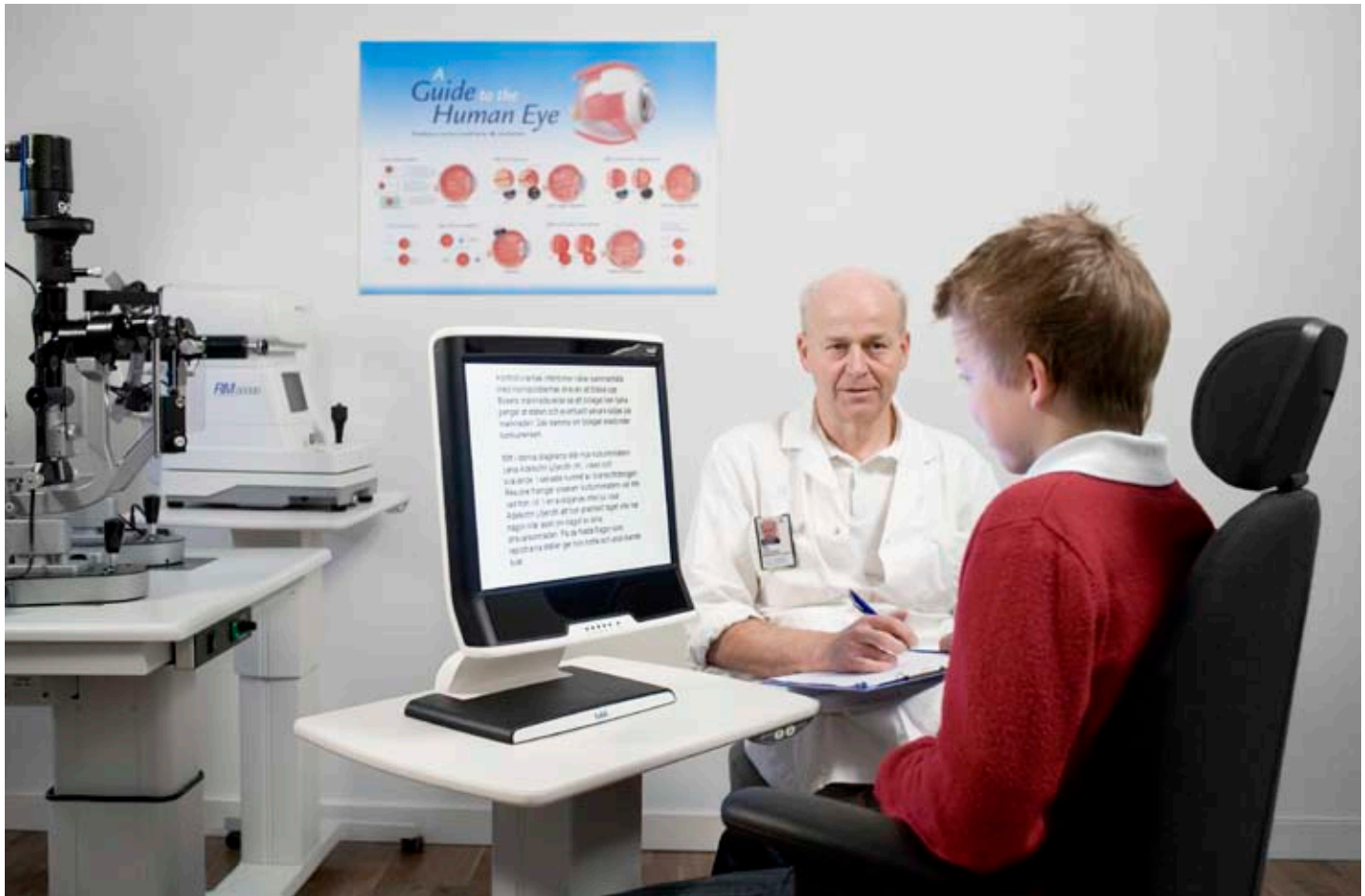
- Evaluate usability of websites, software, interactive TV and mobile devices .
- Understand human perception of virtual environments and computer games.
- Study cognitive activities in computer-supported learning environments.
- Get valuable insights into human-digital map interaction.

Usability researchers are pairing think-aloud, observations and interviews with eye tracking to add detailed, quantitative data. Eye movements provide a better understanding compared to traditional measures (e.g. success rate, errors) or subjective feedback (e.g. comments and ratings).

- Understand the decision making process.
- Find out what visual cues drive users effectively.
- Understand what user interface elements lead to confusion.
- Determine conclusively why users fail in completing a specific task.



A user that searched for customer service at this web site needed almost 50 fixations to find it.



Neuropsychology & mental health disorders

Cognitive neuroscientists use Tobii Eye Trackers in observations of physiological processes and their correlation with cognitive and emotional influences.

- Study the visual processing that takes place in the brain to allow sight.
- Examine brain activity and eye movements simultaneously while people engage in cognitive tasks (Combination of eye tracking with EEG can tell what regions of the brain are activated in certain tasks or when faced with emotionally loaded images).
- Measure the conditions under which external visual-stimuli of moderate intensity capture spatial attention.
- Analyze object-by-object search mechanisms in studies of change blindness.

In medical diagnostics, use eye tracking to examine visual-exploration strategies in patients with brain damage and neurological diseases. Investigating control mechanisms of eye movements can provide early indicators for diseases such as autism, schizophrenia and Alzheimer's.

Ophthalmology

In the field of ophthalmology, vision specialists use eye tracking to study ocular-motor behavior and vision deficiencies.

- Get information about saccadic performance or tell how peripheral vision reacts to flashing objects and sudden movements.
- Diagnose conditions such as strabismus (uncontrolled inward or outward eye-movement), amblyopia (lazy eye) and glaucoma.

Fellow peers and colleagues share their Tobii experiences.

Tobii Eye Trackers are used in hundreds of leading research labs worldwide. Below are a few enthusiastic responses from researchers using Tobii products.

"A consortium of researchers who study cognitive and language development in human infants has been working closely with the technical staff at Tobii; collectively we have purchased eight Tobii systems. Our experience is that the system offers extraordinary ease of use with infants and young children, especially for calibration and data analyses."

*Richard Aslin
Professor of Brain and Cognitive Sciences, Director, Rochester Center for Brain Imaging
University of Rochester*

"At the Tilburg Institute of Behavioral Economic Research (TIBER) of Tilburg University we are using four Tobii Eye Trackers. We use the Eye Trackers to examine moment-to-moment decision making, such as on websites, or in product-by-attribute matrices. We study attentional responses to print advertisements and television commercials. We chose Tobii Eye Trackers because of the breakthrough integration with LCD screens. This makes eye tracking very natural and unobtrusive and the eye trackers easily transportable. We also chose Tobii because of the ease of calibration. The software is user-friendly to the extent that essentially anyone can be up-and-running in less than an hour. We were immediately convinced and have only become more enthusiastic".

*Rik Pieters
Professor of Marketing
Faculty of Economics and Business
Tilburg University*

"At the Institute of Medical Psychology, Medical Faculty of the University of Magdeburg we use a Tobii Eye Tracker to study vision and eye movements in brain damaged patients undergoing neurological rehabilitation and vision restoration but we also study normal subjects. One important advantage with this system is that it provides a natural testing environment where subjects can move freely in front of the eye tracker. With other eye trackers, holding the head fixed prohibits reliable, long-term recordings and is a too artificial situation. We can adapt the program to our specific research questions. Our experience with the Tobii system is very positive".

*Bernhard A. Sabel, PhD
Professor of Medical Psychology
University of Magdeburg*

"We are very impressed with the tracking robustness, the high accuracy and the excellent linearity across the entire screen of the Tobii Eye Tracker. Also, Tobii has been very responsive and professional in supporting our needs."

*Jan Ygge
Professor in Pediatric Ophthalmology
Karolinska Institutet*

"We have used a Tobii system to record oculomotor behavior in infants, children, and adults since 2003. We have found the Tobii useful for a wide range of questions of perceptual and cognitive development, including the recording of gaze patterns during free viewing, preferential looking and visual discrimination, visual search,

and oculomotor anticipation and smooth pursuit. The system is flexible and compatible with many third-party applications, such as E-Prime, Director, and Matlab, which greatly expands its potential. The calibration routine is friendly to both the experimenter and the research participant, especially infants."

*Scott P. Johnson
Professor of Psychology
University of California, Los Angeles*

"Clemson houses four Tobii Eye Trackers, three installed in the eye tracking lab and one in my office. One aspect I appreciate is the Tobii's ease of programmability – this is where it really shines for me. Tobii designed the system in a very clever way, following a client/server model. This means that I pretty much have full control of the device from within the client programs that I write for it. Calibration and use of the tracker is by far much nicer than with older equipment.

*Andrew Duchowski
Assoc Professor of Computer Science
Clemson University*

"The Institute of Psychology, CAS has one Tobii Eye tracker for the time being, which is used in the evaluation of websites, software usability tests and human attention mechanisms research. The Tobii Eye Tracker meets our requirements of the engineering psychology experiments and is really easy to operate."

*Sun Xianghong
Professor of Institute of Psychology
Chinese Academy of Sciences*



Your complete stationary or mobile eye tracking lab.

Tobii Eye Trackers and Tobii Studio™ provide a comprehensive system for effective capture and high-level analysis of eye gaze data, a PC screen, user video and much more.

Tobii Eye Trackers

Tobii Eye Trackers are easy to use, fully automatic and track basically every research subject. High accuracy, advanced drift-compensation, large tolerance OF head movements and optimization of bright and dark pupil-tracking provides you with a natural testing environment and high quality data throughout the entire population.

Tobii T60 & T120 Eye Trackers are integrated into a 17" monitor, and are ideal for all forms of eye tracking studies with stimuli that can be presented on a screen.

Tobii X120 Eye Tracker is our most flexible system, recommended for studies that require particular stimuli set-ups, such as a TV or other display, a projection screen, or a physical product.

Tobii Eye Trackers are the only systems that allow you to use E-Prime for designing and running gaze contingency paradigms.

Tobii Studio™ Analysis Software

Tobii Studio gathers eye gaze data in real time and provides flexible high-level analysis tools. Replay your eye-gaze video, calculate eye-tracking metrics and visualize eye-gaze data through gaze plots, heat maps, video clips and more.

Tobii Studio includes a range of features specifically designed to meet your research needs, such as infant calibration, support for scene camera and external video setups, trigger signals, demographical filtering, mixed and randomized stimulus, Matlab/SPSS compatible data and more. Gaze data are combined with recording of user video, sound, key-strokes, mouse clicks, event logging and other data streams for a holistic view of behavior.

Please request our separate product brochures and descriptions for more information about Tobii T60, T120 & X120 Eye Trackers and Tobii Studio.

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